CLAIMS

1. A mask for the protection against biological agents consisting in a plurality of layers, characterized in that at least one of them, having filtering functions, is composed of borosilicate micro-glass fibers bound together by a vinyl acetate resin, the fiber matrix being supported by a strong, cellulose based, substrate and the structure being treated with a silicone based coating to impart hydrophobic properties.

2. A mask as claimed in claim 1 composed of three layers of material:

- a central layer having filtering function and the features described in claim 1
- an inner layer having shape-retaining function
- an outer layer having covering function

3. A mask as claimed in claim 2 characterized in that the filter layer has thickness ranging between 150 and 400 microns and unit area ranging between 25 and 65 g/m^2.

4. A mask as claimed in claim 2 characterized in that the inner layer, with the function of providing support for the filtration layer and structure to the mask body, is made from non-woven fabric obtained by polypropylene or polyester fibers

5. A mask as claimed in claim 2 characterized in that the inner layer is made from non-woven fabric consisting in polypropylene fibers

6. A mask as claimed in claim 2 characterized in that the outer layer, with the function of protecting the filtration layer from abrasion, is made from non-woven fabric obtained by polyolefins, polyester or nylon fibers

7. A mask as claimed in claim 2 characterized in that the outer layer is made from meltblown polypropylene fibers

8. A mask as claimed in claim 1, equipped with a valve to facilitate the breathing which opens, in response to increased pressure, when the wearer exhales, allowing air to be rapidly evacuated from the mask interior, and which closes during inhaling

9. A mask as claimed in claim 8, characterized in that the valve comprises a valve seat over which is secured a raised valve cover, carrying apertures. The seat is composed by a flat surface, having orifices which allow the air flow.

In the centre of the seat, a low thickness relief rises.

The cover is equipped with apertures allowing the air passing through. Inside the cover, in the centre, a valve flap (h) is attached by an appropriate support; the flap is made from flexible material and represents the mobile component which opens and closes the valve. The valve can be made from the various materials suitable for thermoforming, preferably is made from moulded polypropylene; the flap is made from an elastic flexible material such as, for example, synthetic rubber.

The valve is attached to the centre of the mask where an aperture is also created.

When the wearer inhales, the valve flap seals against the relief, preventing air from flowing, while, when the wearer exhales, the valve flap lift away from the relief, letting air pass through.

Consequently, inhaled air enters the mask exclusively through the filter media of the mask whereas exhaled air passes through the aperture of the

mask and the orifices in the valve.

10. A mask as claimed in claim 9 characterized in that the relief of the valve seat owns a concave surface wherein a continuos, cylinder shaped, plastic lays all along the surface of the relief.

The plastic can be made from synthetic polymers obtained from different monomers and can be produced with different mixtures, for example, with fluoro, silicone or nitrile based mixtures.

The plastic is designed, in terms of dimensions and structure, to provide the highest seal during closing. In fact, when the valve flap seals against the relief, it goes into direct contact with the plastic; then, due to the dimensions of the flap support and the plastic thickness, the valve flap flexes up on the edges.

The flap material, thanks to its intrisec memory and to elastic properties, perfectly seals onto the plastic surface; in addition, the compatibility of the two materials, having the same chemical-physical superficial properties, ensures a perfect adherence.

11. A mask as claimed in claim 10 characterized in that the relief of the valve seat is circular, the valve flap is round shaped and the continuos, cylinder shaped, plastic is an O-ring which lays all over the circumference of the relief.

12. A mask as claimed in claim 11 characterized in that the valve's components have shapes and dimensions as shown in fig. 13.

13a: valve seat, front view

x: 45 mm

y: 30 mm

z: 26 mm

13b: valve seat, side view

x: 1mm

y: 4.2 mm

z: 4 mm

13c: valve cover, front view

x: 32 mm

y: 30 mm

z: 18 mm

13d. valve cover, side view

x: 8 mm

y: 3 mm

z: 1 mm

w: 3.5 mm

13e: valve flap

x (diameter): 30 mm

13. A mask as claimed in claim 1 characterized in that the mask is equipped, on the edges, with a boundary sealing layer to improve the seal; the boundary layer is applied all along the perimeter of the mask, starting from the side joins; the seal layer tightly fits over the wearer's face perfectly adapting to any face shape; that ensures a leak free contact to the wearer's face, without pin holes and distorsions which would allow contaminants to pass through the mask body without being removed by the filtering material.

14. A mask as claimed in claim 13 characterized in that the material of the boundary sealing layer is made from a natural rubber latex resin or a silicone based resin

15. A mask as claimed in claim 13, characterized in that the boundary sealing layer is made from natural rubber latex applied in some 2 mm thickness and in unit area ranging between 200 and 400 g/m^2

16. A mask as claimed in claim 1, characterized in that, adjoining the boundary sealing layer as claimed in claim 13, a strip, made from the same material than the boundary sealing layer, is applied in the nose clip area; the strip makes the mask more comfortable to wear and, further on, improves the seal between the mask and the face at the nose portion wherein deformations and plies may normally be present

17. Use of the mask as claimed in claim 1 as protective mean against biological agents

18 Use of the mask as claimed in claim 1, equipped with a valve as claimed in claim 10, as protective mean against biological agents.

19. Use of the mask as claimed in claim 1, equipped with a valve as claimed in claim 10 and with a boundary sealing layer as claimed in claim 13, as protective mean against biological agents

20 20. Use of the masks as claimed in claim 17, 18 and 19 as protective mean against Hepatitis C Virus (HCV), Hepatitis B Virus (HBV), Human Immunodeficiency Viruses (HIV), Sp. Pseudomonas, Staphylococcus aureus, Serratia Marcescescens, Bacillus Anthracis

21. A valve to facilitate the breathing as claimed in claim 10

22. A valve to facilitate the breathing as claimed in claim 11

23. A boundary sealing layer as claimed in claim 13 to improve the hermetic seal against biological agents

24. A boundary sealing layer as claimed in claim 14 to improve the hermetic seal against biological agents

25. A boundary sealing layer as claimed in claim 15 to improve the hermetic seal against biological agents